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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,556	04/12/2004	Masashi Enomoto	S1459.70088US00	2616

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Randy J. Pritzker
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, MA 02210

EXAMINER	
MOWLA, GOLAM	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
09/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/822,556	ENOMOTO ET AL.	
	Examiner	Art Unit	
	GOLAM MOWLA	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/04/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment of 05/14/2008 does not place the Application in condition for allowance.

2. Claims 1-31 are pending. Applicant has amended claims 1, 7, 9-14 and 22-26, and added new claims 27-31.

Status of the Objections or Rejections

3. Due to Applicant's amendment of claims, the rejections of claims under 35 U.S.C. 112 from the office Action mailed on 02/13/2008 are withdrawn.

4. The rejection of claims 1, 7 and 22-26 under 35 U.S.C. §112 are withdrawn in view of Applicant's amendment.

5. The rejection of claims 1-6 and 9-17 under 35 U.S.C. 102 as being anticipated by Meinhardt et al. ("Optoelectronic Device made from Multilayer and Molecularly Doped Organic Layers," SPIE Conference on Organic Photonic Materials and Devices Vol. 3623, January 1999, pp. 46-57, cited in previous Office Action) are withdrawn in view of Applicant's amendment to claims 1 and 9-14. New ground(s) of rejection under 35 U.S.C. 102/103 is/are necessitated by the amendments.

6. The rejection of claims 7-8 and 18-26 under 35 U.S.C. 103 as being unpatentable over Meinhardt in view of Takahashi et al. (US 6261684) and/or Kawakami et al. (US 5320723) and/or Li et al. (US 2003/0188776) are withdrawn in

view of Applicant's amendment. New ground(s) of rejection under 35 U.S.C. 103 is/are necessitated by the amendments.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 19, 25-26, and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 is indefinite because it recites “a strongly acidic semiconductor fine particle dispersion” in lines 2-3. However, the term “strongly” renders the claim indefinite as the Applicant is not claiming any specific pH value which would make the dispersion strongly acidic. Herein, Examiner treats an acidic dispersion with any pH value as strongly acidic dispersion.

Claim 25 is indefinite because it recites the limitation "semiconductor electrode" in line 10. There is insufficient antecedent basis for this limitation in the claim. Examiner suggests deleting “electrode” after “semiconductor” in line 10, and inserting “fine particle layer” after “semiconductor” in line 10. Claim 31 is indefinite as it depends on claim 25.

Claim 26 is indefinite because it recites the limitation "semiconductor electrode" in line 9. There is insufficient antecedent basis for this limitation in the claim. Examiner

suggests deleting "electrode" after "semiconductor" in line 9, and inserting "fine particle layer" after "semiconductor" in line 9.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

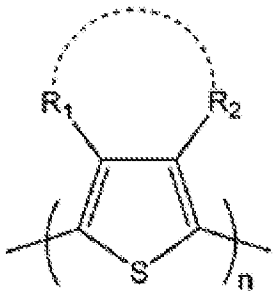
1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-13 and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. (US PGPUB 2002/0015881) in view of Roman et al. (WO/00/65653; reefer to US 6852555, which is equivalent to WO/00/65653). Additional support is provided by Meinhardt and also by the chemical structure provided by "Laboratory for Surface Physics and Chemistry".

Regarding claims 1 and 2, Nakamura teaches a fabrication method of a photoelectric conversion device (see title and abstract; see also fig. 1 and [0023-0024])

comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) and a metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) to be an opposite electrode formed on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

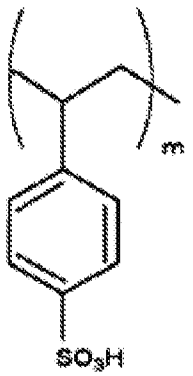
However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 1 or 3 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 2 or 4, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 1]



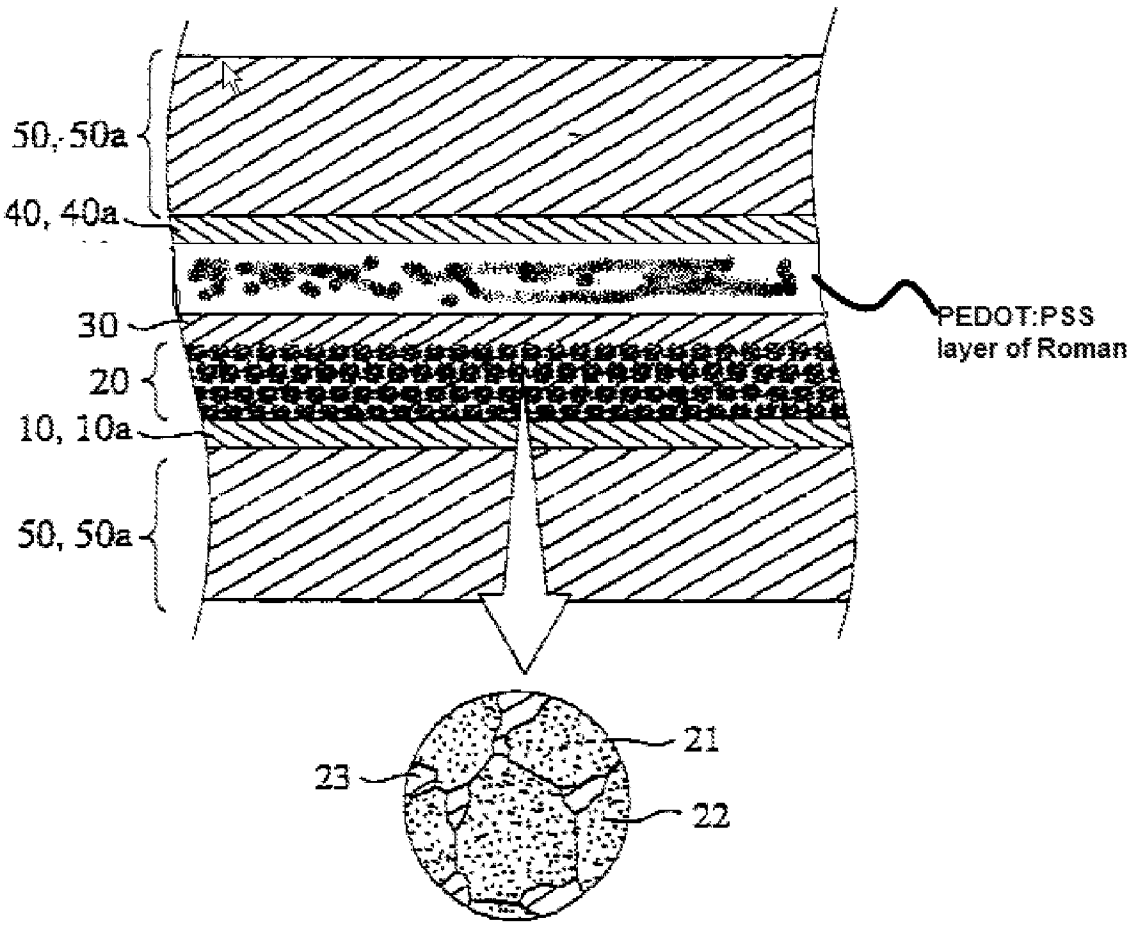
---------- [Formula 2]

Roman teaches a method of making an organic thin-film semiconductor device (see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

PEDOT doped with PSS has the structure of instant claimed formula 3 and formula 4 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman has the following modified figure:

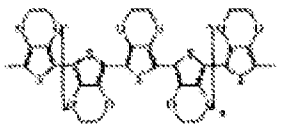


---------- (fig. 1)

The above illustrated fig. further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming the metal film (40) on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above fig.1).

Regarding claim 3, Nakamura as modified by Roman further teaches that the intermediate film (PEDOT:PSS layer of Roman) is formed by using an aqueous solution containing polyethylene dioxythiophene defined by the following Formula 5,

polystyrenesulfonic acid ion defined by the following Formula 6, and polystyrenesulfonic acid defined by the following Formula 7. PEDOT doped with PSS is commercially available in an aqueous suspension as evidence given by Meinhardt, chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and Starck GmbH (http://server2.idtechex.com/products/en/presentation.asp?presentationid=646 accessed 1/31/2008) defined by the following Formula 1, polystyrenesulfonic acid ion defined by the following Formula 2, and polystyrenesulfonic acid defined by the following also Formula 3 as shown in Figure 1 of ,



Formula 1

Formula 2

Formula 3

Regarding claim 4, Nakamura further discloses that the metal oxide film (10) is made of In-Sn oxide (see [0029]).

Regarding claim 5, Nakamura further discloses that the metal film (40) is made of at least one metal selected from platinum, gold, aluminum, copper, and silver (see [0125]).

Regarding claim 6, Nakamura further discloses that the metal film (40) is a monolayer film (see fig. 1) made of at least one metal selected from platinum, gold, aluminum, copper, and silver (see [0125]).

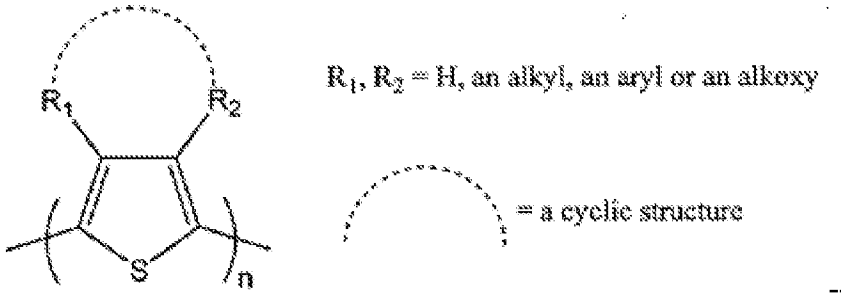
Regarding claim 7, Nakamura further discloses that the semiconductor electrode (20) is composed of semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]), the semiconductor fine particles (21) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

Regarding claim 8, Nakamura further discloses that the photoelectric conversion device is a wet type solar cell ([0023], [0047] and [0135-0137).

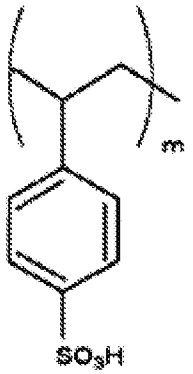
Regarding claim 9, Nakamura teaches a photoelectric conversion device (see title and abstract; see also fig. 1 and [0023-0024]) comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) and a metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) to be an opposite electrode formed on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 8 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 9,

RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



---------- [Formula 8]



---------- [Formula 9]

Roman teaches an organic thin-film semiconductor device (see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

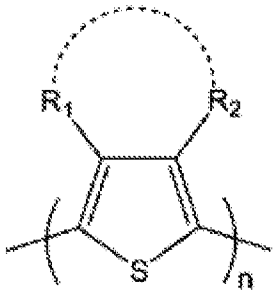
PEDOT doped with PSS has the structure of instant claimed formula 8 and formula 9 (see chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming the metal film (40) on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 1).

Regarding claim 10, Nakamura teaches a manufacturing method of an electronic apparatus (photoelectric conversion device; see title and abstract; see also fig. 1 and [0023-0024]) comprising a metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) formed on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 10 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 11, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6,

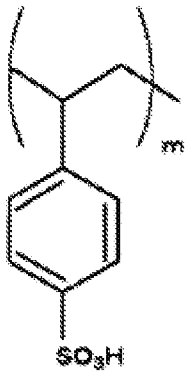
HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 10]



---------- [Formula 11]

Roman teaches a method of making an electronic apparatus (organic thin-film semiconductor device see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

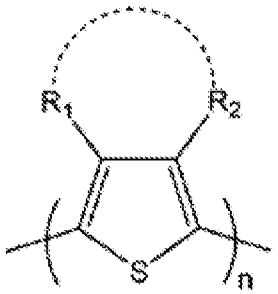
It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

PEDOT doped with PSS has the structure of instant claimed formula 10 and formula 11 (see chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and the metal film (40) is formed on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 1).

Regarding claim 11, Nakamura teaches an electronic apparatus (photoelectric conversion device; see title and abstract; see also fig. 1 and [0023-0024]) comprising a metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) formed on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

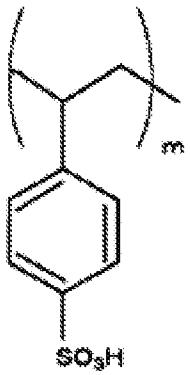
However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 12 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 13, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 12]



---------- [Formula 13]

Roman teaches an electronic apparatus (organic thin-film semiconductor device see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

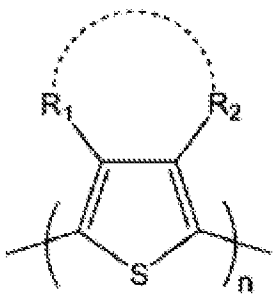
It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

PEDOT doped with PSS has the structure of instant claimed formula 12 and formula 13 (see chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and the metal film (40) is formed on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 1).

Regarding claim 12, Nakamura teaches a metal film formation method for forming metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

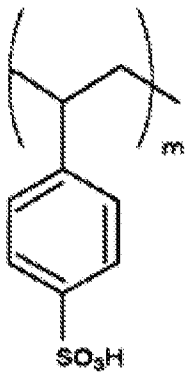
However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 14 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 15, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 14]



---------- [Formula 15]

Roman teaches a method of making an electronic apparatus (organic thin-film semiconductor device see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

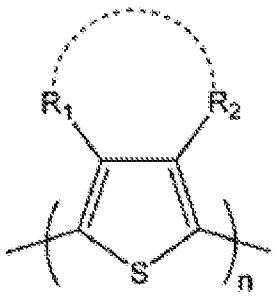
It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

PEDOT doped with PSS has the structure of instant claimed formula 14 and formula 15 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and the metal film (40) is formed on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 1).

Regarding claim 13, Nakamura teaches a layer structure comprising a metal film (counter electrode conductive layer 40; fig. 1; [0023-0024] and [0124]) formed on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]).

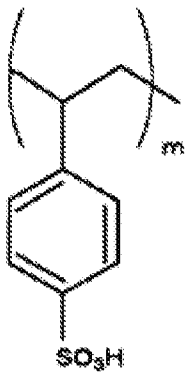
However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 16 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 17, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the metal film on the intermediate film, the metal film directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 16]



---------- [Formula 17]

Roman teaches a layer structure (see fig. 2c) wherein the metal film (first layer 2, see fig. 2c; col. 2, lines 58-63 and col. 4, lines 45-48) is directly coated with an intermediate layer (overlying second layer 3; see fig. 2c) which is made of PEDOT doped with PSS (see col. 3, lines 1-13, and col. 4, line 39 to col. 5, line 31). Roman coats the metal electrode with the PEDOT:PSS because it possesses a very high work function (see col. 2, lines 7-11).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal film (40) of Nakamura with the conducting polymer PEDOT:PSS of Roman because it possesses a very high work function and therefore increases the work function of the anode (metal film) as shown by Roman.

PEDOT doped with PSS has the structure of instant claimed formula 16 and formula 17 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Roman further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and the metal film (40) is

formed on the intermediate film (PEDOT:PSS layer of Roman), the metal film (40) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 1).

Regarding claim 27, Nakamura further discloses injecting an electrolytic layer (charge transporting layer 30; see fig. 1; see also [0023-0024], [0088-0089] and [0103-0106]) between the metal film (40) and a semiconductor fine particle layer (20) (fig. 1).

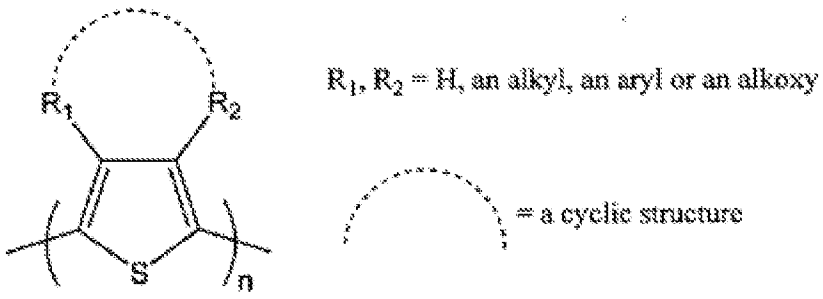
Regarding claim 28, Nakamura further discloses injecting an electrolytic layer (charge transporting layer 30; see fig. 1; see also [0023-0024], [0088-0089] and [0103-0106]) between the metal film (40) and a semiconductor fine particle layer (20) (fig. 1).

12. Claims 14-26 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of Meinhardt. Supporting evidence is provide by the chemical structure provided by "Laboratory for Surface Physics and Chemistry" (accessed from http://www.ifm.liu.se/surfphys/pedot-pss.html on 08/21/2008).

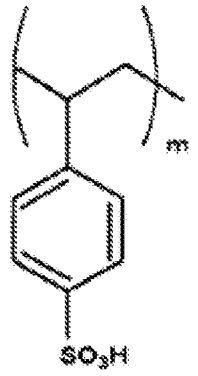
Regarding claims 14 and 15, Nakamura teaches a fabrication method of a photoelectric conversion device (see title and abstract; see also fig. 1 and [0023-0024]) comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) composed of semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particles

(21) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 18 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 19, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor electrode directly contacting the intermediate film:



---------- [Formula 18]



---------- [Formula 19]

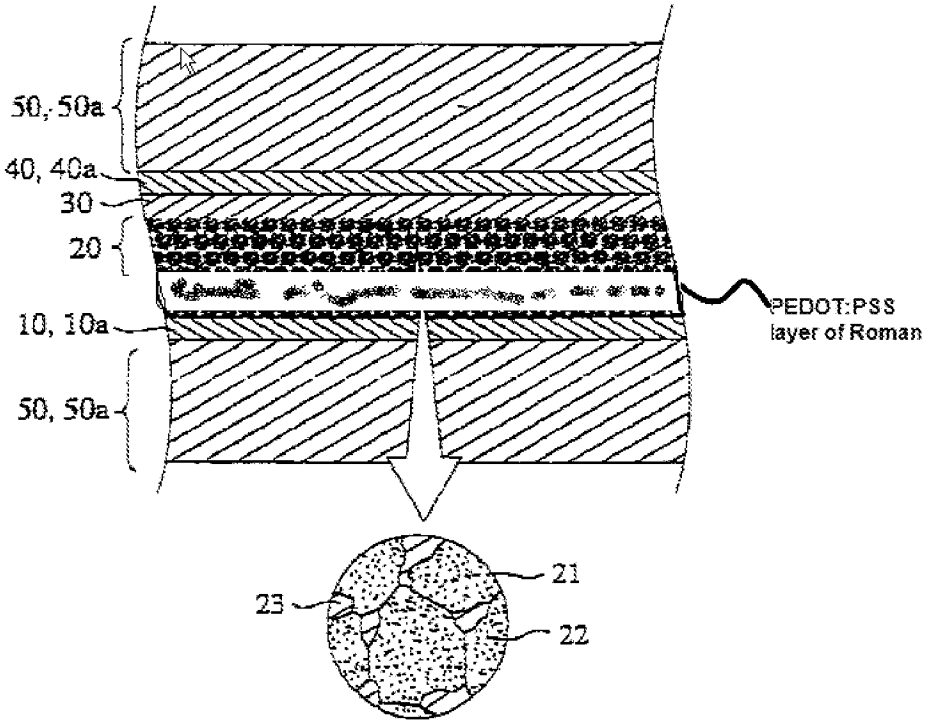
Meinhardt teaches the method of making an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated

with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

PEDOT doped with PSS has the structure of instant claimed formula 21 and formula 21 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt has the following modified figure:

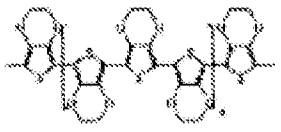


---------- (fig. 2)

The above illustrated fig. further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor electrode (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the semiconductor electrode (20) directly contacting the intermediate film (PEDOT:PSS layer; see above fig. 2).

Regarding claim 16, Nakamura as modified by Meinhardt further teaches that the intermediate film is formed by using an aqueous solution containing polyethylene dioxythiophene defined by the following Formula 22, polystyrenesulfonic acid ion defined by the following Formula 23, and polystyrenesulfonic acid defined by the following Formula 23. PEDOT doped with PSS is commercially available in an aqueous suspension as evidence given by Meinhardt, chemical structure of PEDOT/PSS

provided by “Laboratory for Surface Physics and Chemistry”, and Starck GmbH (http://server2.idtechex.com/products/en/presentation.asp?presentationid=646 accessed 1/31/2008) defined by the following Formula 1, polystyrenesulfonic acid ion defined by the following Formula 2, and polystyrenesulfonic acid defined by the following also Formula 3 as shown in Figure 1 of ,



Formula 1

Formula 2

Formula 3

Regarding claim 17, Nakamura further discloses that the metal oxide film (10) is made of In-Sn oxide (see [0029]).

Regarding claim 18, Nakamura further discloses the metal oxide film (10) is formed on a transparent plastic substrate (transparent base 50a; fig. 1; [0023] and [0029]).

Regarding claim 19, Nakamura further discloses the semiconductor electrode (20) is formed by using a strongly acidic semiconductor fine particle dispersion (see [0071-0072]).

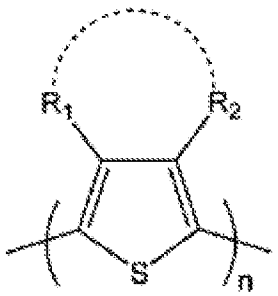
Regarding claim 20, Nakamura further discloses that the semiconductor electrode is formed at a temperature in the range of 100^{O}C to 250^{O}C (see [0062]). Although this disclosed range in not within the claimed range of 100^{O}C to 140^{O}C, Nakamura discloses that a lower temperature is preferred with heat resistance of the plastic polymer substrate take into consideration (see [0029]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have determined the optimum temperature by routine experimentation to form semiconductor fine particles such that it does not damage the plastic polymeric substrate. In addition, "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). See also MPEP § 2144.05 – IIA.

Regarding claim 21, Nakamura further discloses that the photoelectric conversion device is a wet type solar cell ([0023], [0047] and [0135-0137).

Regarding claim 22, Nakamura teaches a photoelectric conversion device (see title and abstract; see also fig. 1 and [0023-0024]) comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) composed of semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particles (21) having an average particle diameter of primary

particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

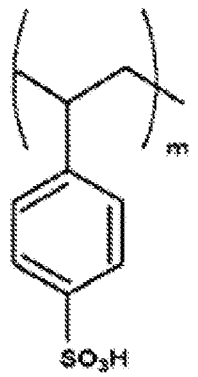
However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 25 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 26, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor electrode directly contacting the intermediate film.



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 25]



---------- [Formula 26]

Meinhardt teaches the method of making an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated

with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

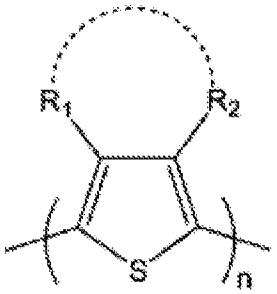
PEDOT doped with PSS has the structure of instant claimed formula 25 and formula 26 (see chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor electrode (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the semiconductor electrode (20) directly contacting the intermediate film (PEDOT:PSS layer; see above illustrated fig. 2).

Regarding claim 23, Nakamura teaches a manufacturing method of an electronic apparatus (photoelectric conversion device; see title and abstract; see also fig. 1 and [0023-0024]) comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) composed of semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) on a metal oxide film

(conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particles (21) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

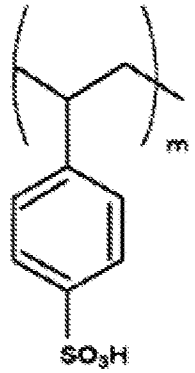
However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 27 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 28, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor electrode directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 27]



---------- [Formula 28]

Meinhardt teaches the method of making an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

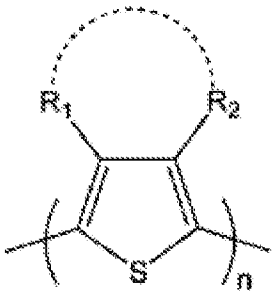
PEDOT doped with PSS has the structure of instant claimed formula 27 and formula 28 (see chemical structure of PEDOT/PSS provided by "Laboratory for Surface Physics and Chemistry", and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor electrode (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the semiconductor electrode (20) directly contacting the intermediate film (PEDOT:PSS layer; see above fig. 2).

Regarding claim 24, Nakamura teaches an electronic apparatus (photoelectric conversion device; see title and abstract; see also fig. 1 and [0023-0024]) comprising a semiconductor electrode (photosensitive layer 20 containing semiconductor particles

21; fig. 1; [0023-0024]) composed of semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particles (21) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

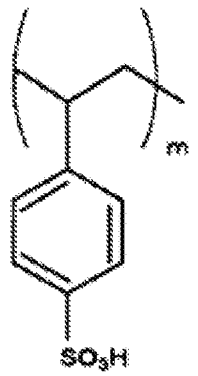
However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 29 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 30, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor electrode directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 29]



---------- [Formula 30]

Meinhardt teaches an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

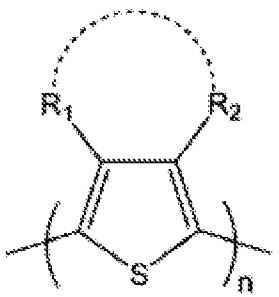
PEDOT doped with PSS has the structure of instant claimed formula 29 and formula 30 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor electrode (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the

semiconductor electrode (20) directly contacting the intermediate film (PEDOT:PSS layer; see above fig. 2).

Regarding claim 25, Nakamura teaches a semiconductor fine particle layer formation method for forming a semiconductor fine particle layer (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particle layer (20) including semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

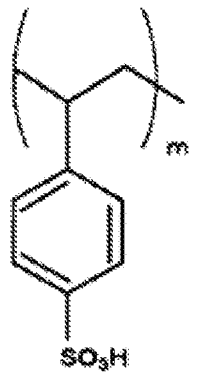
However, the reference is silent as to whether the method includes steps of forming an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 27 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 28, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor fine particle layer directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 31]



---------- [Formula 32]

Meinhardt teaches a method of making an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

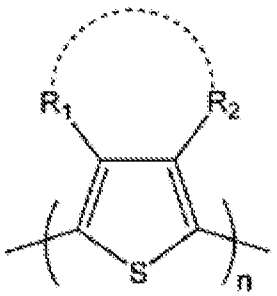
PEDOT doped with PSS has the structure of instant claimed formula 31 and formula 32 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor fine particle layer (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the

semiconductor fine particle layer (20) directly contacting the intermediate film (PEDOT:PSS layer; see above fig. 2).

Regarding claim 26, Nakamura teaches a layer structure of a semiconductor fine particle layer (photosensitive layer 20 containing semiconductor particles 21; fig. 1; [0023-0024]) on a metal oxide film (conducting layer 10; fig. 1; [0023-0024] and [0029]), the semiconductor fine particle layer (20) including semiconductor fine particles (semiconductor particles 21; see fig. 1; [0023-0024]) having an average particle diameter of primary particles ranging between approximate 1 nm to approximately 200 nm (8 to 100 nm; see [0038]).

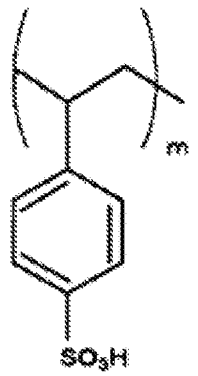
However, the reference is silent as to an intermediate film comprising at least one compound selected from polythiophene defined by the following Formula 33 and its derivatives as well as polystyrenesulfonic acid defined by the following Formula 34, RSO_3H (R=an alkyl, an aryl or an alkoxy), $R'OSO_3H$ (R' = H, an alkyl, an aryl or an alkoxy), HCl, $HClO_4$, HPF_6, HBF_4, and HI_5 on the metal oxide film and forming the semiconductor electrode on the intermediate film, the semiconductor fine particle layer directly contacting the intermediate film:



R_1, R_2 = H, an alkyl, an aryl or an alkoxy

= a cyclic structure

---------- [Formula 33]



---------- [Formula 34]

Meinhardt teaches an optoelectronic device (see title and abstract) wherein the In-Sn oxide film (ITO-electrode; see fig. 2 on page 48) is coated with PEDOT doped with PSS (See 2nd paragraph on page 48) because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability (See 2nd paragraph on page 48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have coated the metal oxide film (10) of Nakamura which is also made of In-Sn oxide (see [0029]) with the conducting polymer PEDOT:PSS of Meinhardt because it allows for high transmission in the visible spectral region, low sheet-resistance, good thermal stability and UV-stability, as shown by Meinhardt.

PEDOT doped with PSS has the structure of instant claimed formula 33 and formula 34 (see chemical structure of PEDOT/PSS provided by “Laboratory for Surface Physics and Chemistry”, and also fig. 1 of Meinhardt et al on page 47).

Nakamura as modified by Meinhardt further shows that the intermediate layer (PEDOT:PSS layer) is formed on the metal oxide film (10) and forming semiconductor fine particle layer (20) on the intermediate film (PEDOT:PSS layer of Meinhardt), the

semiconductor fine particle layer (20) directly contacting the intermediate film (PEDOT:PSS layer; see above fig. 2).

Regarding claim 29, Nakamura further discloses injecting an electrolytic layer (charge transporting layer 30; see fig. 1; see also [0023-0024], [0088-0089] and [0103-0106]) between a metal film (40) and the semiconductor fine particle layer (20) (fig. 1).

Regarding claim 30, Nakamura further discloses injecting an electrolytic layer (charge transporting layer 30; see fig. 1; see also [0023-0024], [0088-0089] and [0103-0106]) between a metal film (40) and the semiconductor fine particle layer (20) (fig. 1).

Regarding claim 31, Nakamura further discloses injecting an electrolytic layer (charge transporting layer 30; see fig. 1; see also [0023-0024], [0088-0089] and [0103-0106]) between a metal film (40) and the semiconductor fine particle layer (20) (fig. 1).

Response to Arguments

13. Applicant's arguments Regarding claims 1-26 have been considered but are moot in view of the new ground(s) of rejection.

Due to Applicant's amendment to claims 1, 7, 9-14, and 22-26, a new ground(s) of rejection is made under 35 U.S.C. §103 in view of Meinhardt et al.

Claim Rejections under 35 U.S.C. § 102(b)

Claims 1-6 and 9-17

Applicant argues that "Meinhardt does not disclose an intermediate film on a metal oxide film and a metal film on the intermediate film, with the metal film directly contacting the intermediate film" (see Remarks, page 22, lines 5-7).

The argument is directed to the amended claims and persuasive. However, due to Applicant's amendment, a new ground(s) of rejection under 35 U.S.C. §103 is made in view of Meinhardt et al.

Applicant argues that "Meinhardt does not disclose an intermediate film on a metal oxide film and a semiconductor electrode on the intermediate film, with the semiconductor electrode directly contacting the intermediate film" (see Remarks, page 22, lines 10-12).

The argument is directed to the amended claims and persuasive. However, due to Applicant's amendment, a new ground(s) of rejection under 35 U.S.C. §103 is made in view of Meinhardt et al.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-F, 0900-1700 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./
Examiner, Art Unit 1795

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795